Journal Name

RSCPublishing

ARTICLE

Study of Fe-Pt deposited reduced graphene oxide's utility as a catalyst towards oxygen reduction and methanol oxidation reactions

Cite this: DOI: 10.1039/xoxxoooooox

R. Kannan,[a]* A. A. Silva[a], F. M. Cardoso[a], G. Gupta[a], Z. Aslam[b], S. Sharma[a] and R. Steinberger-Wilckens[a]

Received ooth January 2012,
Accepted ooth January 2012

DOI: 10.1039/xoxxoooooox

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Preparation of Graphene oxide

3 g of graphite powder was taken in a three neck round bottom flask (RBF) fitted with a condenser. 100 ml concentrated sulfuric acid was added to it. $KMnO_4$ solution was added slowly through a burette fitted in one neck while the third outlet was purged through an alkaline bath followed by water bath. All these experiments were done inside the fume cupboard. The addition of $KMnO_4$ was completed in 2 hours. The solution was magnetically stirred during the addition and continued for further two hours. Finally 30% H_2O_2 was added and magnetic stirring continued for 2 more hours. The resulting mixture was washed with dilute acid and water (10 time each) to remove any residual Mn. The resulting graphene oxide powder was filtered and dried in an over at 40°C for 2 days and stored in vials before being used for other experiments.

Figure S1

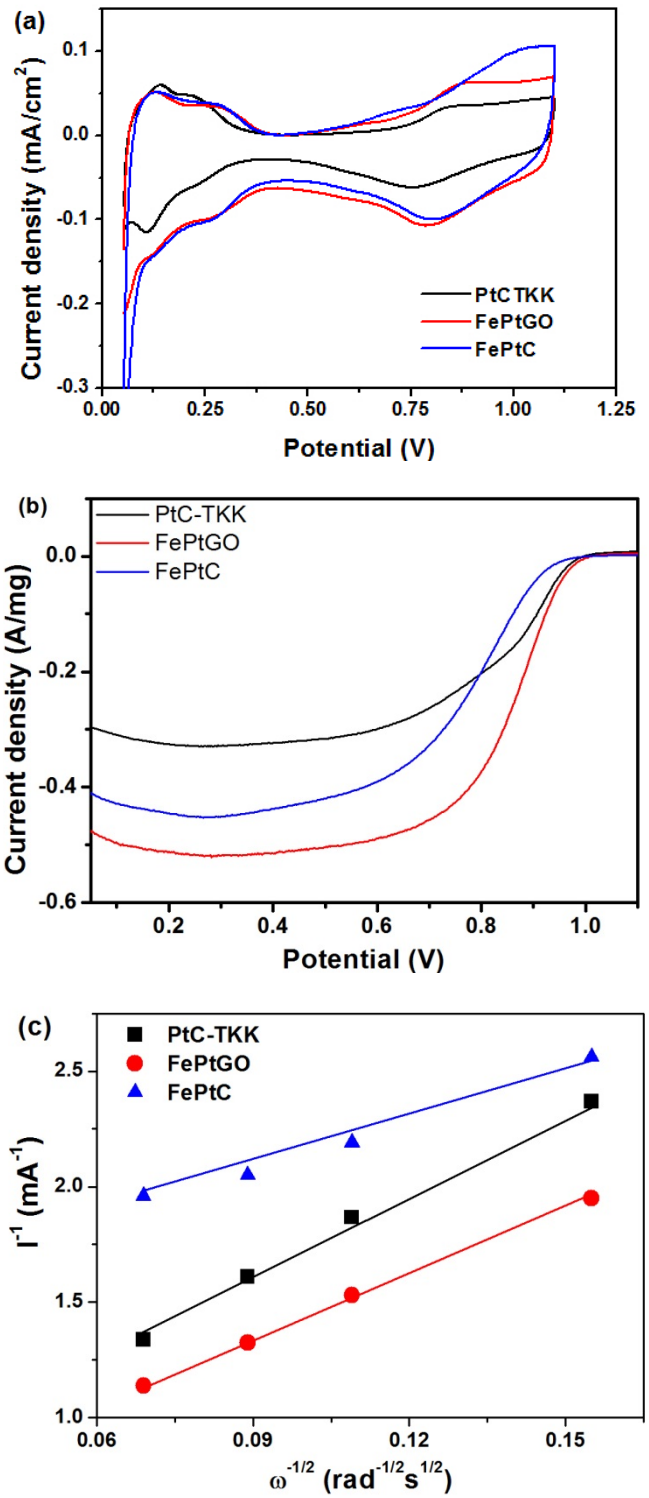

Figure S1. (a) Cyclic voltammetric plots obtained for the prepared catalysts and PtC commercial catalyst in 0.1M $HClO_4$ (b) Linear sweep voltammetric plots obtained at a rotation rate of 2000 rpm for the catalysts and (c) KL plots obtained for the three catalyst systems at 0.78V.

Figure S2

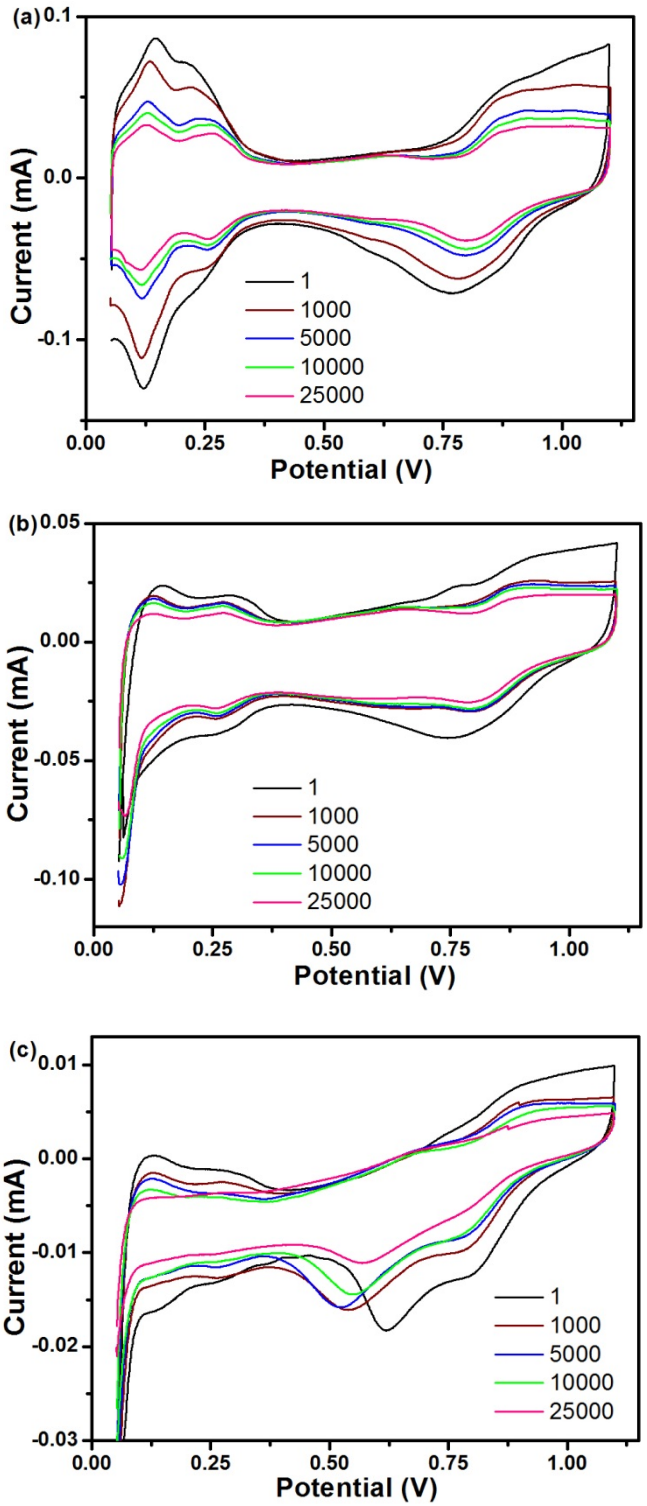

Figure S2. CV plots obtained after accelerated potential sweep durability studies for (a) PtC (b) FePtGO (c) FePtC

Figure S3

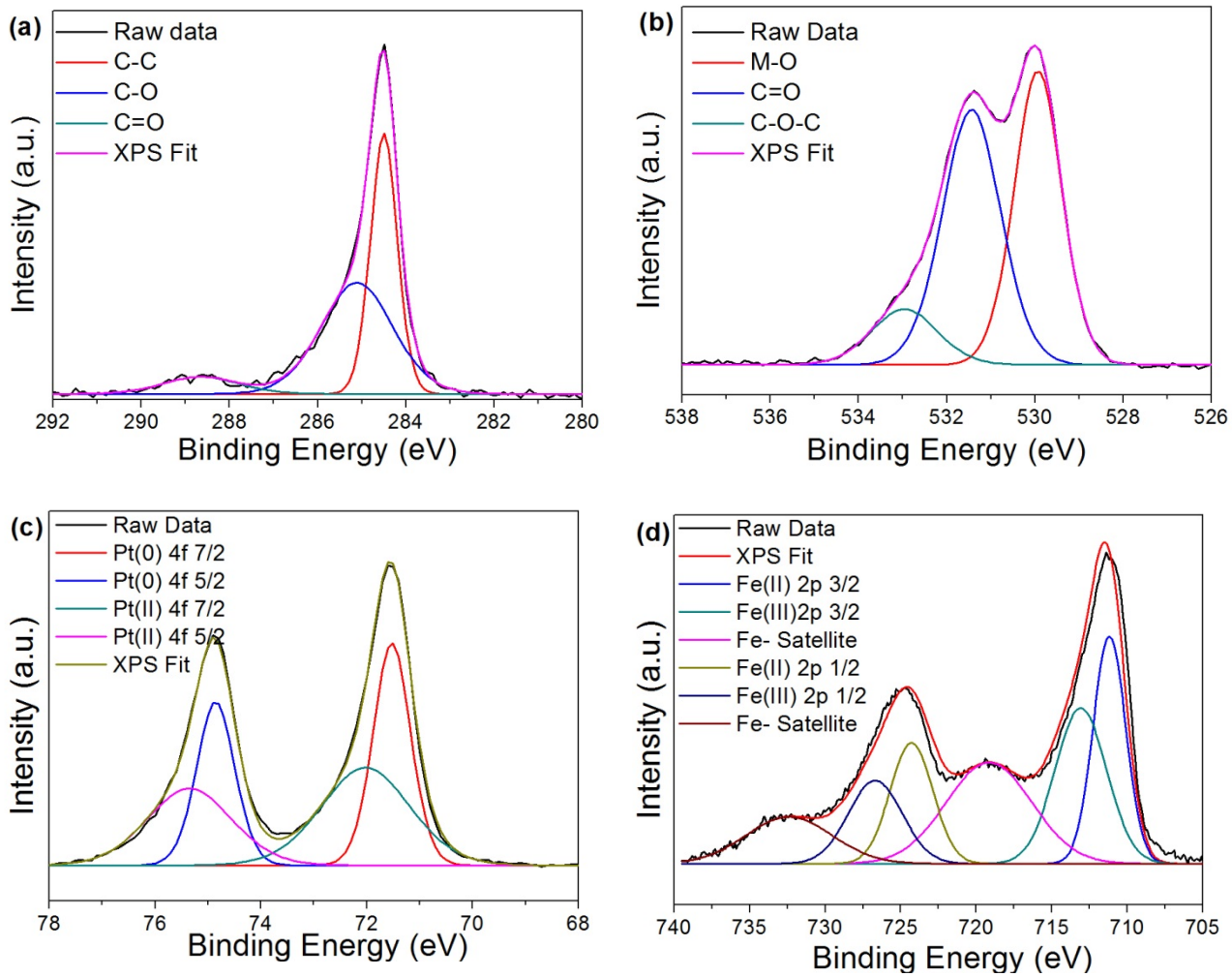

Figure S3. XPS plots obtained for FePtC (a) C1s (b) O1s (c) Pt4f and (d) Fe2p

Figure S4

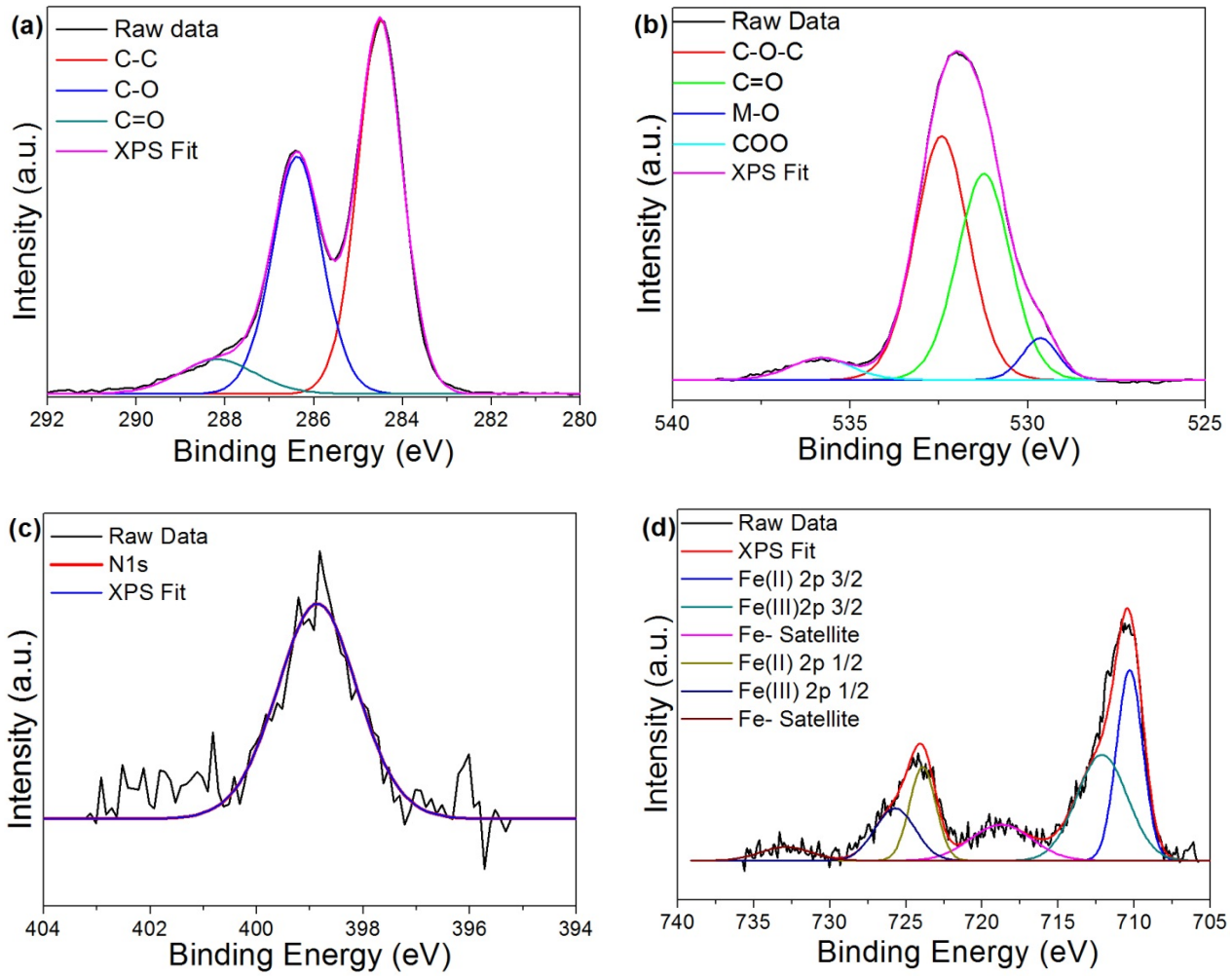

Figure S4. XPS plots obtained for FeGO (a) C1s (b) O1s (c) Pt4f and (d) Fe2p

Figure S5

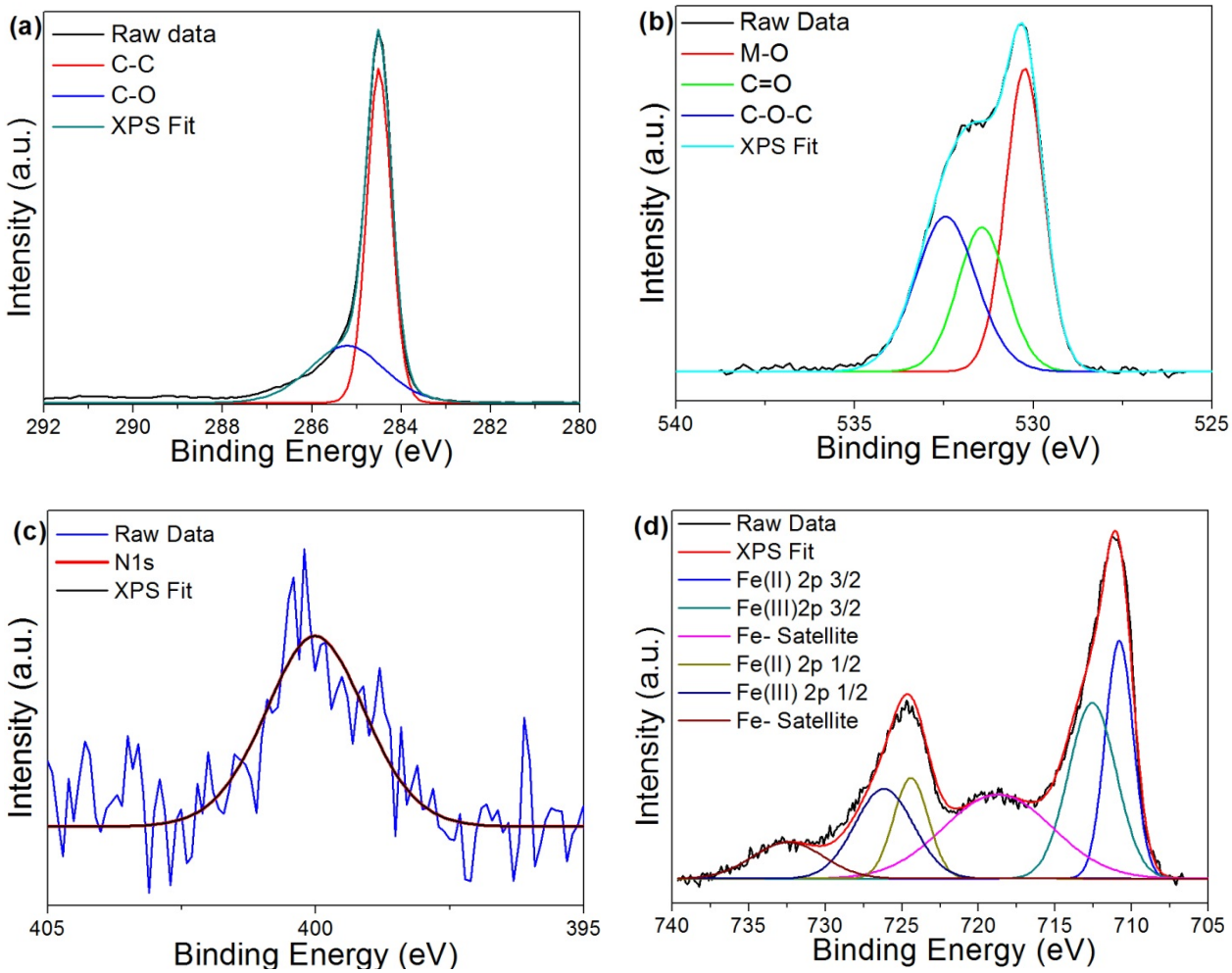

Figure S5. XPS plots obtained for FeC (a) C1s (b) O1s (c) Pt4f and (d) Fe2p

Table S1: atomic composition of the prepared catalysts obtained fromm XPS studies.

Sample name	C	O	Fe	Pt
FePtGO	36.04258	34.1215	4.205448	25.63048
FePtC	24.55849	24.26983	27.54451	23.62717
FeGO	63.62137	35.0362	1.342433	0
FeC	73.45994	13.81827	12.72179	0

Figure S6

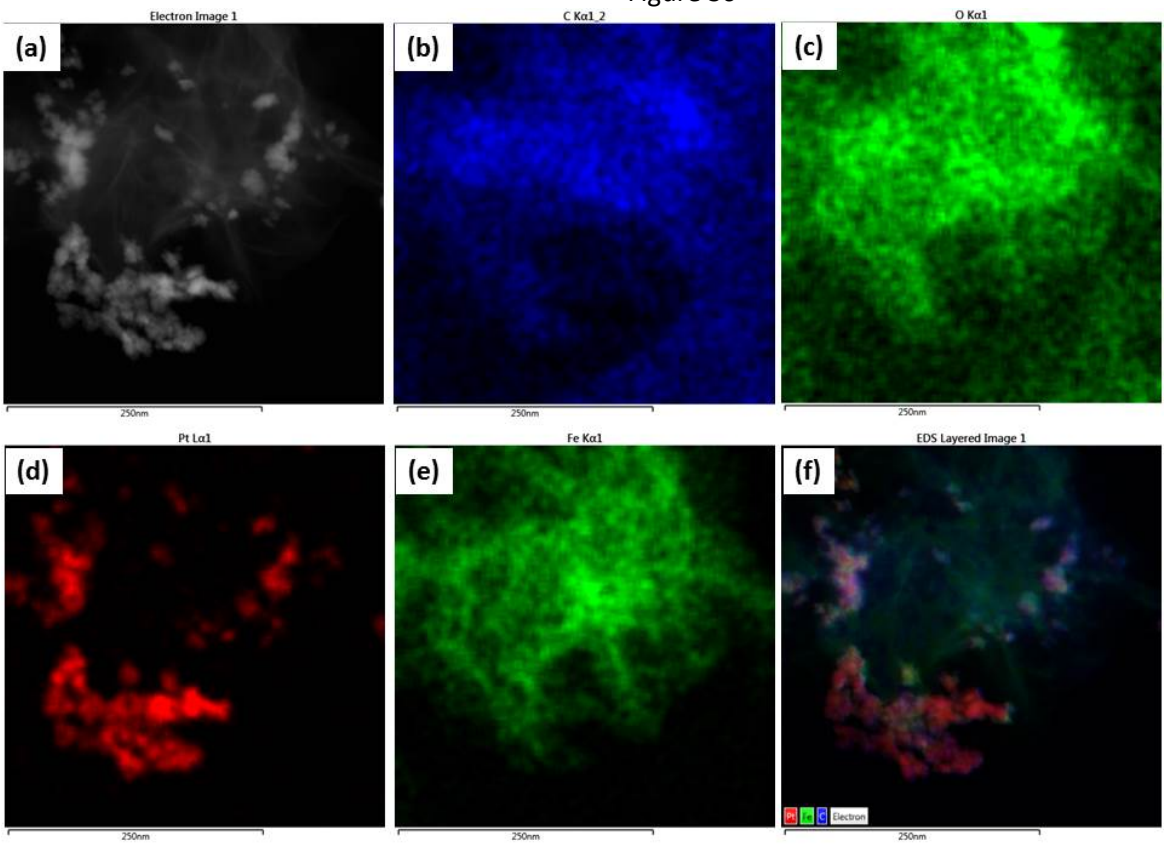

Figure S6. TEM-EDS mapping images obtained for FePtGO.

Figure S7

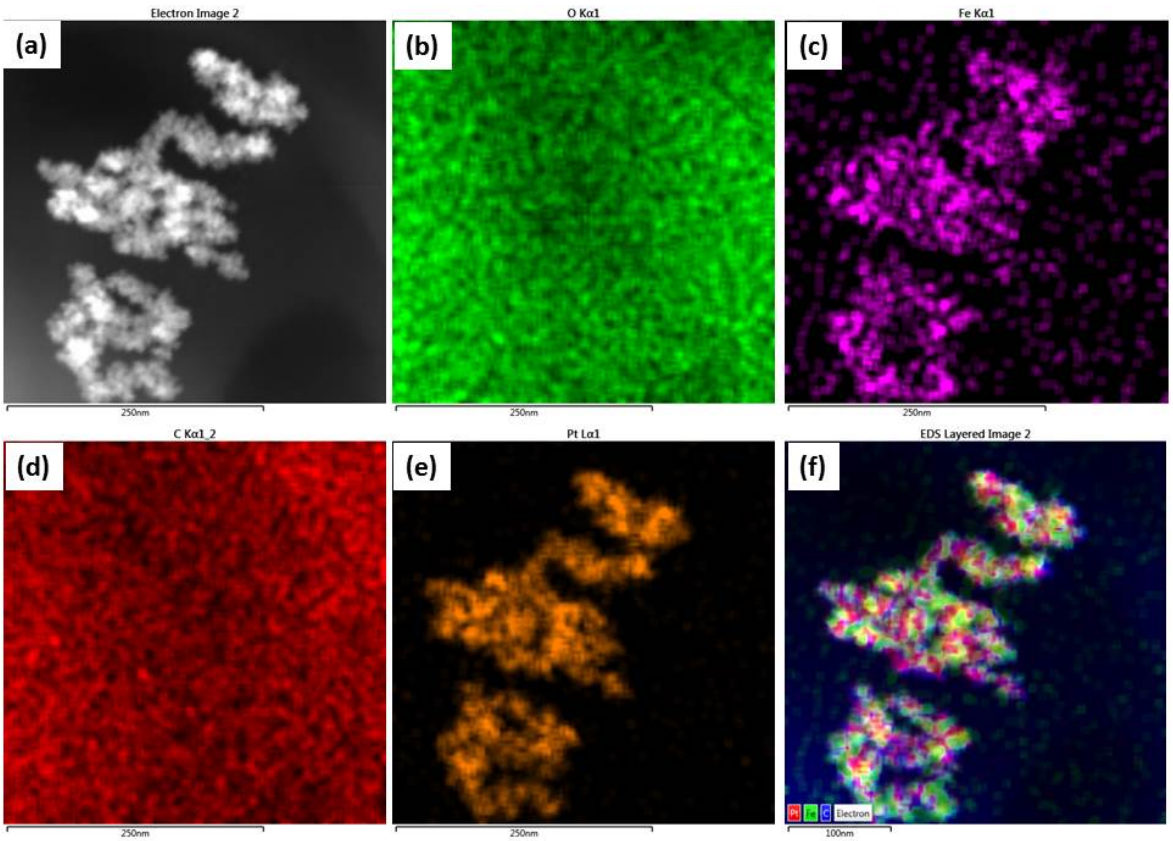

Figure S7. TEM-EDS mapping images obtained for FePtC.